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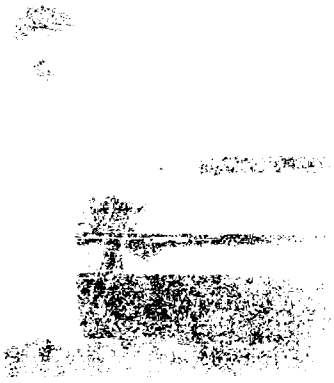
US Army Corps of Engineers



WATER QUALITY RESEARCH PROGRAM

MISCELLANEOUS PAPER EL-89-2

PROCEEDINGS OF THE FIFTH CORPS CHEMISTS MEETING

17-18 MAY 1988

Compiled by

Ann B. Strong, Karen F. Myers, Glennard M. Warren

Environmental Laboratory

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
PO Box 631, Vicksburg, Mississippi 39181-0631

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This paper contains a summary of the Proceedings of the Fifth Corps Chemists Meeting. Presentations and discussions centered around laboratory validations, quality assurance/quality control for Superfund/DERP projects, laboratory inspections, analytical methodology, sampling techniques, and data management. Keywords: Water quality, Dredging, Core Sampling, Munitions analysis, Ebn Chromatography, Analytical Chromatography

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Preface

This paper summarizes the Proceedings of the Fifth Corps Chemists Meeting held 17-18 May 1988 at the US Army Engineer Waterways Experiment Station (WES), Vicksburg, MS. The Analytical Laboratory Group (ALG), Environmental Engineering Division (EED), Environmental Laboratory (EL), was the host and coordinated this activity as part of the Water Quality Work Unit 31766, "Analytical Procedures for Water and Wastewater," which is sponsored by Headquarters, US Army Corps of Engineers (HQUSACE). Water Quality is managed within EL's Environmental Resources Research and Assistance Programs, Mr. J. Lewis Decell, Manager. The Technical Monitor for HQUSACE is Mr. Dave Buelow. Ms. Lynn Lamar, HQUSACE, assisted in the coordination of this meeting.

This report was compiled by Ms. Ann B. Strong, Ms. Karen F. Myers, and Mr. J. Glennard M. Warren of the ALG, EL, and was edited by Ms. Lee T. Byrne of the Information Technology Laboratory. This report was prepared under the general supervision of Dr. Raymond L. Montgomery, Chief, EED, and Dr. John Harrison, Chief, EL.

COL Dwayne G. Lee, EN, was the Commander and Director of WES, and Dr. Robert W. Whalin was the Technical Director.

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Welcome

Dr. Robert W. Whalin
US Army Engineer Waterways Experiment Station

Dr. Whalin, Technical Director at the US Army Engineer Waterways Experiment Station (WES), welcomed the many attendees, noting that it had been 10 years since the US Army Corps of Engineers (ACE) chemists had held a meeting at the WES. Such meetings are important in establishing and continuing communication between the various Corps analytical labs and the Corps engineers and project managers. This meeting offered the opportunity for chemists to express their professional concerns and assess their impact on the overall Corps mission. Dr. Whalin saw the assimilation of the US Army Toxic and Hazardous Materials Agency (USATHAMA) into the Corps as holding the most potential for affecting the role of the chemist within the Corps in the near future.

Question: Where will control of USATHAMA lie organizationally?

Answer: Under the ACE's office.

Question: Will USATHAMA have contracting authority as Divisions do?

Answer: Not sure. There will be no R&D (Research and Development) relocation of people.

Question: What expertise does USATHAMA bring to the Corps?

Answer: Its mission is to look at containment and cleanup problems for the Army. The largest effort is in incineration plants to be built to destroy nerve gas and other contaminants.

Question: Who within the organization has emergency response responsibility?

Answer: Don't know. R&D is a small portion of USATHAMA's budget. The largest portion is directed toward actual implementation of cleanup operations. The move within the R&D community is toward maximizing R&D capabilities between the Corps laboratories.

Review of the Corps Chemists Meeting

Ms. Lynn Lamar
Headquarters, US Army Corps of Engineers

The number of chemists in the Corps Division and Research laboratories has increased steadily over the past 5 years (Figure 1). During that time frame the labs have moved away from monitoring freshwater quality and toward investigating and monitoring hazardous wastes. Meetings of the Corps chemists have become increasingly important in providing a forum for sharing information and for discussing common problems. Attendance at this year's meeting was exceptional, and every effort should be made to continue annual meetings. Past meetings have been hosted by WES (1979), New England Division (1985), Ohio River Division (1986), and South Pacific Division (1987). Corps elements were asked to supply a list of their chemists to Headquarters, US Army Corps of Engineers (HQUSACE) so that a roster for disseminating information can be maintained.

Responsibilities of a Validated QA/QC Lab

Dr. Bruce Heitke
Headquarters, US Army Corps of Engineers

Hazardous waste funding under the Defense Environmental Restoration Program (DERP) has increased steadily since FY 84 and is projected to increase through FY 91. Hazardous and toxic waste (HTW) construction funding is also projected to increase in FY 88 and FY 89 (Figure 2). Superfund full-time equivalent (FTE) manpower requirements are also projected to increase to accommodate expected spending. Most of this work will be contracted to architect-engineers (AEs). The greatest opportunities for Division and research lab participation within the Corps' hazardous waste remedial activities lie in the area of (a) site inspection (confirmation studies) and (b) remedial action (construction). The Missouri River Division (MRD) is expected to continue managing the overall remedial investigation/feasibility study and the development of remedial designs.

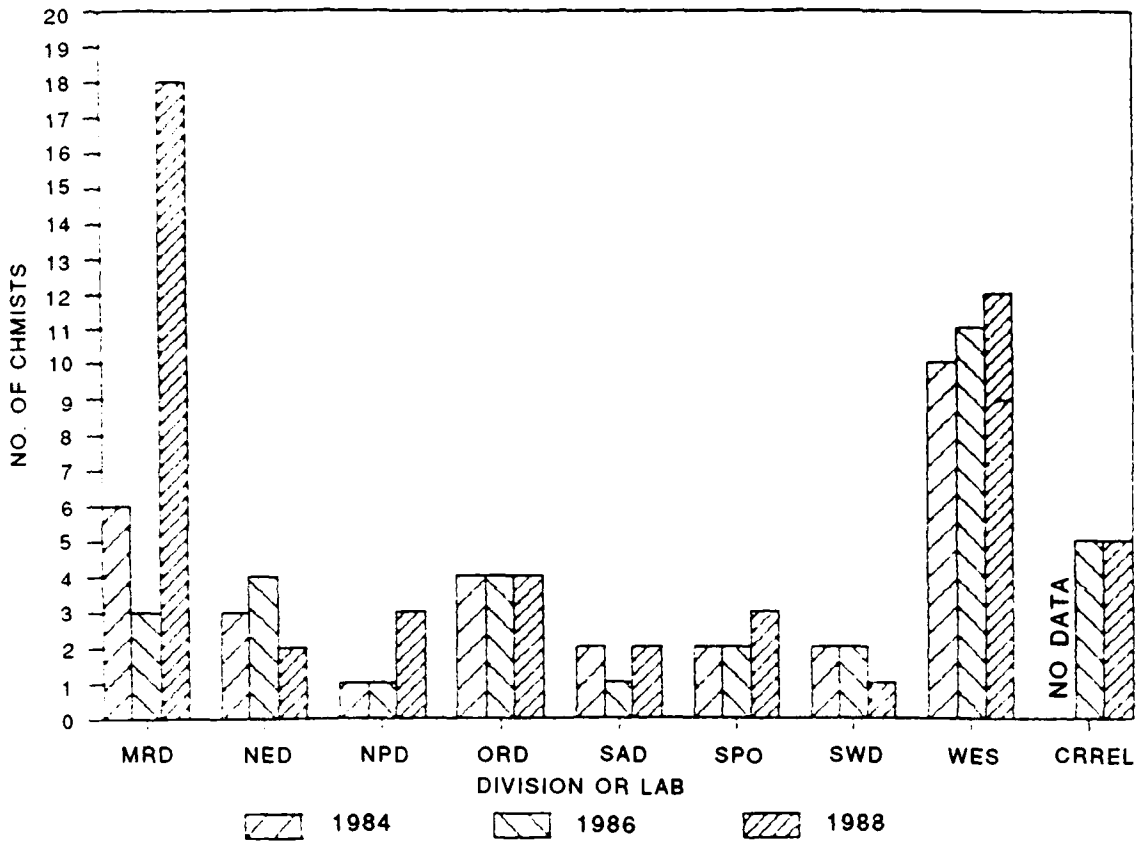

Figure 1. Corps Division and research laboratory chemists, February 1988

The purpose of the assurance/quality control (QA/QC) lab within this effort is to support the contracting officer in providing correct project specifications and ensuring that deliveries meet specifications. The QA/QC lab is expected to interact with program management to provide chemical data quality management (CDQM). The CDQM responsibilities are: review of documents; inspection and analysis of QA samples followed by comparison of analytical results obtained by contract and Division laboratories; technical assistance in the form of sample collection, analysis, and QA/QC; and preparation of final chemical data assurance reports.

Question: What is being done to upgrade chemists and scientists to the status that engineers enjoy within the Corps?

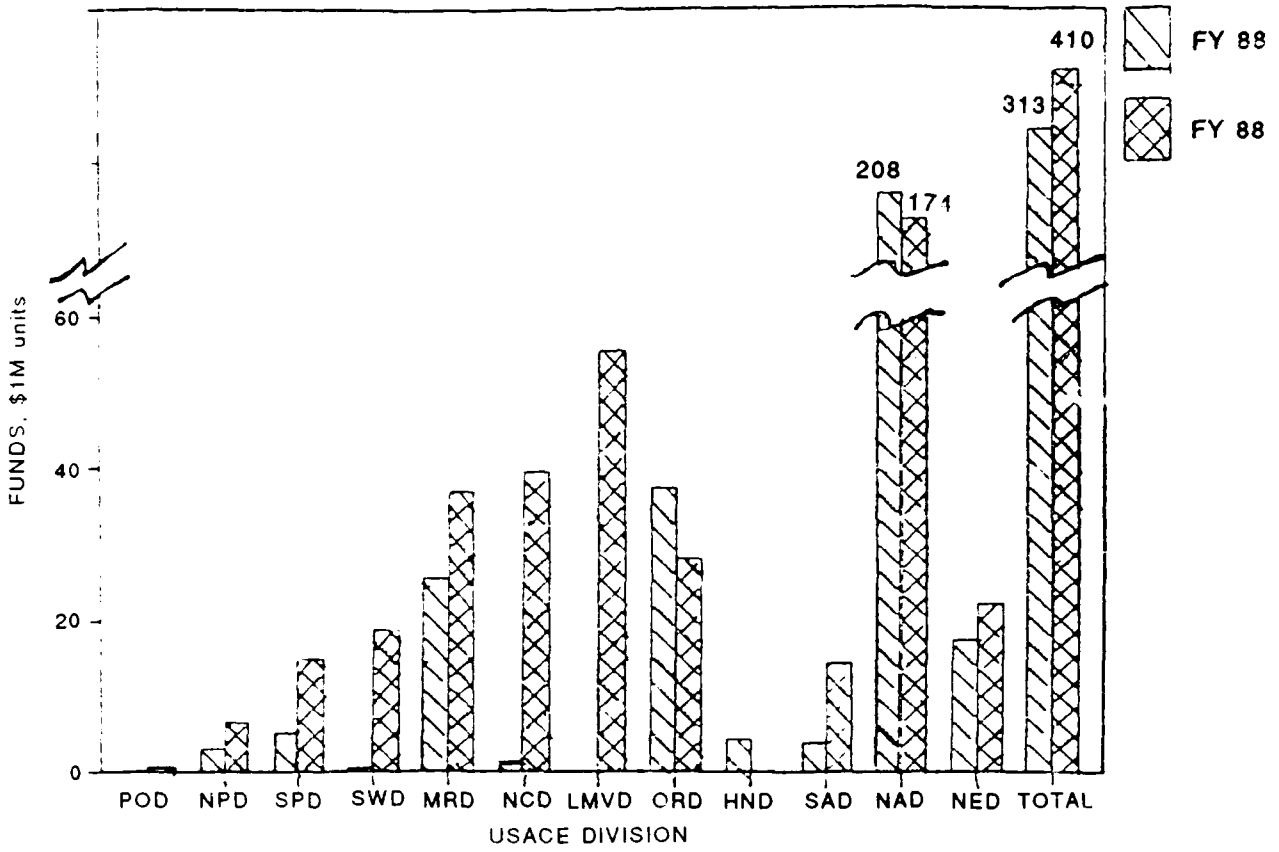

Figure 2. Hazardous and Toxic Waste construction funding by HTW location, FY 88 and FY 89

Answer: HQUSACE needs the full participation of chemists to fulfill its mission. There will be more chemists hired. Since jobs are competitive, they will have to do what is necessary to get and keep good quality people. The problem is that those in the upper management do not understand the need. The short-term outlook for increased pay and status for chemists and scientists is not good. Any advances will be in the future. The Corps no longer gives bonus salaries to scientists as it does to the engineers. In the job market the Corps no longer pays salaries comparable with the outside. Promotions for grade step (GS) levels 11-13 are hindered by the complexity of the requirements within the job descriptions.

Overseeing QA/QC for Contract Laboratories

Dr. Joe Solsky
Missouri River Division

A quality assurance laboratory plays an ongoing role in the development and implementation of DERP projects. The QA lab is called upon to provide technical advice pertaining to sampling and analysis during the drafting of the Scope of Work, and to review and revise the contractor's chemical quality control plan as it pertains to sampling analysis and performance audits prior to AE selection. The QA lab also inspects and validates the analytical lab chosen to fulfill contract requirements. During the course of the project, the QA lab receives and reviews QA samples. It may also analyze these samples. The QA lab reviews and monitors QC data provided by the contract lab. The QA lab writes the final chemical QA/QC report, which will then be incorporated into the final AE engineering report.

The secret to being successful when overseeing QA/QC for contract labs is documentation. Every phase of the QA/QC must be able to withstand close technical scrutiny. This can only be achieved through rigorous documentation. Contract labs participating in the QA program will find the QA lab more credible when all is documented. Likewise, QA labs should encourage and assist contract labs in establishing and maintaining reliable QC programs. The documentation process is to be emphasized when inspecting the contract labs.

Statistically about 75 percent of the projects monitored by MRD have errors serious enough to be brought to the attention of the project manager or the QA lab. About 20 percent of the projects have problems detected at the sampling and analysis stage which are serious enough to warrant resampling or reanalysis of existing samples. Such decisions can be justified because of the MRD's excellent documentation program, its system of sample tracking, and the process of QA/QC sample review and verification.

Question: Has any contracting agency requested that the QA lab's data be validated?

Answer: This is almost always precluded if the QA lab keeps adequate documentation which begins when the sample enters the lab and continues through each analysis.

Comment: Some common problems occur at the time of sampling when onsite inspections are rare. QA samples may not have been taken at the original sampling time. The sampling team may have used the wrong containers or the wrong preservatives.

Question: Are blind QC samples really blind?

Answer: Not really. However, some labs have problems analyzing these samples. This is one of the means we have of determining if the data are acceptable.

Question: MRD's position in the process of reviewing the AE's Quality Control Plan frequently causes problems by holding up the AE contractor's work. Some project managers feel they have sufficient chemical background and are close enough to the project to do the review themselves. Would you comment?

Answer: The reviewer's job is facilitated by an increased familiarity with and knowledge of the project he is reviewing. However, the reviewer does need input from a QA lab (not necessarily MRD). There must be means available to ensure that he has the expertise and experience to do an adequate job.

The QA Audit Sample Program

Mr. Richard Karn

US Army Engineer Waterways Experiment Station

The WES currently distributes QA samples and validates data for the Corps audit sample program which is a part of the contract laboratory validation procedure. It is not uncommon for portions of the data a lab returns to be in error or to lie outside a set analytical range. Most common problems are found to be one of two types: procedural or analytical. Errors in either data computation or transcription are very common. Dilutions of the samples or standards may not have been accounted for. Data from soil samples may be reported in water quality units.

Analytically, problems involve the proper preparation and storage of in-house standards, the omission of a regularly used external QC sample check program, and the practice of splitting spiked organic water samples to obtain duplicates. Ideally the entire organic sample should be used and the bottle rinsed with the appropriate solvent. Problems with standards also occur when

the standards are not freshly made or have been diluted but not labeled as such. Use of external QC samples will help detect these types of problems. Specific problems include the following:

a. Polychlorinated biphenyls (PCBs). Some labs do not always run all of the standards needed to accurately identify an aroclor. Quantitation is then based upon the wrong aroclor, and concentration errors may have been introduced. Interferences from sulfur may not be detected if the laboratory fails to do sample cleanup.

b. Pesticides. Two-column confirmation is not always used. Proper cleanup may not have been used. Too great a reliance may be placed upon computer confirmation. Since different brands of software examine peaks and retention times differently, data from one system may not coincide with data obtained from another. More reliance should be placed upon the analyst's experience and upon double checking the data for confirmation.

c. Volatile organic analysis (VOA). Standards for these compounds are unstable. They may have been inadequately stored or not prepared frequently enough. Solvents used for extracting sediments with high VOA can have impurities.

d. Base neutral/acid extractables (BNA). Laboratories need to monitor surrogate recoveries to identify problems such as improper pH adjustment, poor extraction, or sample concentration.

e. Gas chromatograph/mass spectrometer (GC/MS). A common GC/MS analytical problem occurs with the identification/quantification of isomers (compounds with the same molecular weight and approximately the same GC retention time).

f. Total recoverable petroleum hydrocarbons. Laboratories not using the specified wavelengths experience problems with peak selection, usually resulting in erroneously high concentrations.

g. Metals. Most of the problems encountered have involved the analysis of the sediment audit sample. High levels of iron can interfere with inductively coupled plasma (ICP) analysis of cadmium. Barium analysis by flame AA may be hampered by ionization problems. High chloride levels can interfere with the hydride analysis of selenium. Tin standards degrade rapidly with time. Low-level tin standards should be prepared daily using 10-percent HCl.

Comment: Many Scopes of Work specify large containers because the contract samplers want to do multiple analyses from one bottle. Information concerning the matter of poor and inconsistent data from duplicate split organic samples needs to reach the project managers.

Comment: The Districts need statistics on the number of contract laboratories failing the audit sample program. The information would be beneficial when trying to convince procurement not to award contracts solely on the basis of the lowest bid.

Comment: Districts need lists of prevalidated labs from which to choose contract labs.

Response: Validations may be out of date due to personnel turnover, changes in instrumentation, methodology, etc.

Question: Do Corps labs have any control over which labs are chosen?

Answer: Yes. The Corps QA lab does not select the contract lab, but makes the final decision on whether the lab chosen by the contractor is acceptable.

Computer Systems for Lab Operations, PCs and Others

Mr. Don Brown

US Army Engineer Waterways Experiment Station

The choice a lab makes in selecting and converting to a computer system should be based on five components: (a) the people who will use the system; (b) procedures--how will the system be used, i.e., for data acquisition, final reports, or number crunching; (c) data--how will data enter the computer system and be manipulated; (4) program--what software do laboratory personnel intend to use; and (e) hardware--the Personal Computer (PC) itself. The type of hardware chosen should be determined by the answers to the above questions.

PCs generally fall into three categories: (a) IBM and compatibles; (b) MacIntosh--Apple; and (c) MassComp--powerful for data acquisition but not MS-DOS compatible. Within the lab PCs can be used individually, can be linked into a network, or can be incorporated into a LIMS system.

Estimated costs of computerizing a lab must take into consideration the cost of training users as well as the cost of purchasing hardware and software.

A newsletter created for advising laboratory PC users and keeping them abreast of current hardware and software developments is available from the following address:

LABORATORY PC USER
5989 Vista Loop
San Jose, CA 95124-9954
(408) 723-0947

A LIMS System for Water Quality Data, Water Quality Sample Tracking

Mr. Tom Leuschen
Missouri River Division

Since its advent, the desk top computer has found its way into numerous laboratory applications, among them water quality sample tracking. Prior to 1985 water quality sample tracking at MRD was a costly, time-consuming manual operation. In June 1985 MRD initiated a study that would begin to employ computers in this process. Sample tracking at MRD (Figure 3) is now completely computerized, utilizing a system which can be upgraded in order to increase system efficiency. The data base is presently run on a Kaypro 286i (AT compatible) with Mountain Tape backup unit and is capable of tracking 25,000 parameters.

Entering the system, samples are assigned MRD identification numbers; and pertinent information such as sample origin, collection date, container type, preservative, and condition upon arrival is noted. Forms are generated to accompany samples through analysis whether performed by MRD personnel or by contract lab personnel. The forms identify such things as methods to be used and the detection limits expected. The data base system is capable of generating final reports (with sections for comments on sample or analysis), is capable of downloading onto the Environmental Protection Agency (EPA) 04 format Storet System for transmission to EPA's IBM 3090 mainframe computer located in Raleigh, NC, and is capable of handling billing.

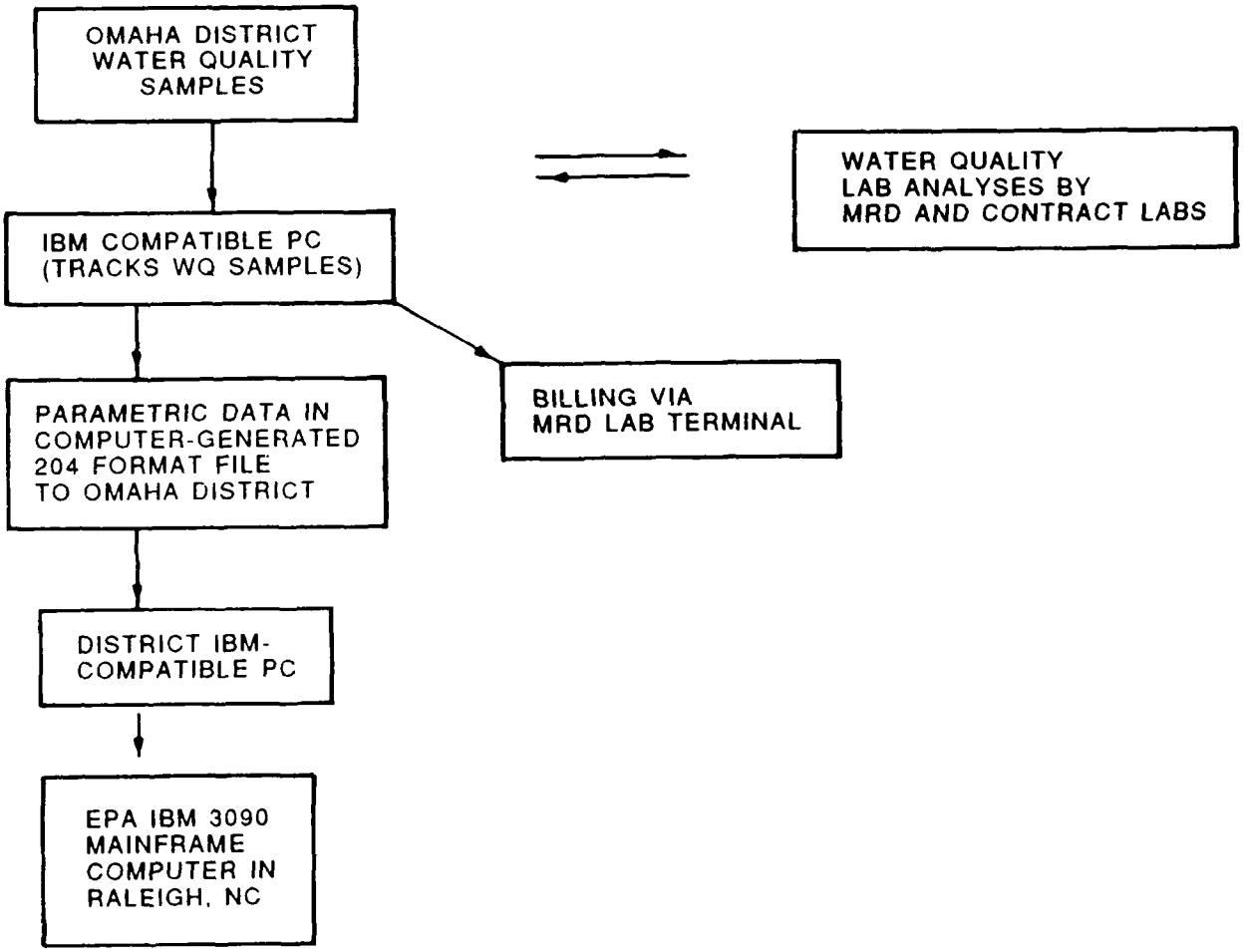

Figure 3. Sample tracking at MRD

Current Problems Facing the Division Labs

Mr. Jeff Tye
Southwestern Division

Division labs are not funded. They survive on the revenues they generate and as such can be in competition with commercial labs for work. The viability of many Division labs has become threatened by the A-76 agenda requiring Corps agencies to contract out as many functions as possible. Division labs also face competition from other Government agencies such as the US Geological Survey (USGS) and the US Fish and Wildlife Service. It has become increasingly important that the labs maintain a good relationship with the Districts they serve. Division labs need to provide good, fast service at competitive prices.

Division labs are dependent upon PRIP funds for equipment and instrumentation replacement. Often these funds are not available when they are needed. Another severe problem facing labs is that of keeping and then filling employee slots with qualified personnel. Hiring practices, inequitable pay scales, and promotion practices impede the latter. Contract students fill in the labor shortage short term, but the time and expense of their training are lost when they return to school or graduate.

Comment: The USGS is now soliciting work from MRD.

Comment: Water quality work (considered slow growth) is almost entirely being contracted out.

Comment: Some Districts are required by Division regulation to utilize their Division laboratories for water quality analyses.

Preparing In-House SOPs for Methods

Dr. Joe Solsky
Missouri River Division

In-house Standard Operating Procedures (SOPs) are an essential component of a water quality laboratory's QA program. These SOPs provide the analyst with written guidelines outlining analytical protocol to be followed and outlining documentation required during the use of analytical methodologies. Adherence to the procedural guidelines set forth in in-house SOPs can reduce the variability found among analysts within the same laboratory.

Tasked by HQUSACE to develop its own in-house SOPs, the MRD gained permission from the American Society for Testing and Materials (ASTM) to use as its outline an unofficial draft of guidelines for developing analytical laboratory protocols. Important to note in the ASTM guidelines draft is the emphasis placed upon detailed documentation of the procedures used within the lab, of these procedures as applied to individual sample sets, and of any modifications in these procedures. Important also is the use of annual procedure audits to ensure the analyst's continued understanding and use of the approved procedures.

The ASTM draft advises the appointment of persons within the lab to monitor pertinent publications for notices of official changes in standard procedures used by that lab. One such publication is the Resource Conservation and Recovery Act (RCRA) Newsletter, edited by David Freidman, Office of Solid Wastes, US Environmental Protection Agency (USEPA). The newsletter is free.

The MRD's in-house SOP consists of four volumes: (a) general information and methodologies; (b) inorganic analysis; (c) hydrocarbon analysis including oil and grease; and (d) pesticide and PCB analysis. A first copy was presented to HQUSACE through Dr. Bruce Heitke at the Corps Chemists Meeting at WES. Copies of the MRD's SOP should be available after 1 June 1988.

Sampling Protocol, Inclusion in Chemical QA

Dr. Richard Medary
Kansas City District

When taking field samples of ground water, several factors must be considered in order to produce analyses indicative of site activity. Field samples retrieved in a nonprescribed manner will often yield misleading results. For sampling situations that do not identify with a set procedure, care must be taken to assure consistency--from container cleaning, to sample preservation, to sample reception for analysis. Sampling technique is crucial to overall project efforts and should be executed with care.

Many problems associated with sample collection are wide-ranging due to site specificity and should be treated accordingly. Some problems common to most ground-water samples are whether to filter the sample for metals analysis and determining the proper well-purge volume. Another sampling problem is selecting the best method for sampling soil for volatile organic analysis.

Water Quality Remote Sensing Techniques, Use of Spot HRV Data in the Corps Dredging Program

Mr. John Adams
Buffalo District

In June 1986 the Buffalo District carried out a pilot study to determine the feasibility of using satellite imagery to monitor Corps dredging and open-water disposal. The site chosen was the western basin of Lake Erie (the Toledo Harbor area). Surface water quality samples were taken at selected points within and surrounding the disposal site at the time of satellite passover. The object was to map the distribution of suspended sediment during dredging and disposal and to correlate the satellite imagery with suspended solids, turbidity, and secci depth data. Suspended solids, secci depth and spectral imagery were found to correlate well. Future studies should incorporate more surface sampling, more satellite passovers, and the use of clay particle differentiation to determine origin of sediment plumes.

In all, the pilot effort demonstrated that satellite imagery has the potential to be used to monitor suspended solids during dredging.

Vibra-Core Sampler, Geotechnical Lab

Mr. Joe Dunbar
US Army Engineer Waterways Experiment Station

The vibra-core sampler, developed as a prototype in the Geotechnical Laboratory at WES 5 years ago, has proven to be an excellent sampling method in saturated areas where more traditional sampling methods such as hand sampling and rig drilling have proven to be ineffective or problematic. The vibra-core sampler is portable, inexpensive, easy to operate, and capable of taking a fully undisturbed continuous sample of up to 30 ft.* The pipe is vibrated into the soil, then extracted and cut into manageable-sized pieces which can be sealed and taken away from the site fully intact. The technique is such that it should lend itself well to sampling environmental or hazardous materials along flood plains and the shores of beaches, lakes, or disposal sites.

Role of the Chemist in Document Review

Mr. Del Connealy
Omaha District

At the MRD, chemists are involved in reviewing pertinent portions of all documents pertaining to hazardous waste remedial activities from the original bid announcement, contractor selection, and Scope of Work to the cost estimates and awarding of AE contracts including their laboratory quality management plans, etc. Documentation to be reviewed continues through contract lab validations, AE sampling and analyses plans, AE QC plans, Government QA plans, AE QC reports, and the final AE investigative report. The chemist's knowledge and expertise can be beneficial in terms of saving time and dollars in the review of remedial design documents, service contracts, source

* To convert feet into metres, multiply by 0.3048.

selection, and other procurement procedures. Document review is very time-consuming. In the ideal situation, the review team should begin participation in the early stages of the project's conception, and the same team should follow the project from the Scope of Work to its finish.

The chemist plays a similar role in the construction phase of projects.

Status of the Interlaboratory Testing Program

Ms. Ann B. Strong
US Army Engineer Waterways Experiment Station

In the fall of 1987, the WES Analytical Laboratory Group coordinated an interlaboratory testing pilot study designed to provide a measure of the proficiency of Corps labs performing water quality analyses. Quality control water samples for metals and PCBs were distributed to all Division labs; six participated. When received, the data were reviewed to determine if they fell within acceptable ranges. Labs reporting data out of range were informed and allowed to repeat the analysis. Final data were analyzed statistically and incorporated into tables. All labs were assigned numbers to protect their confidentiality. Copies of the final report were distributed among the participating laboratories. The participating labs demonstrated their ability to perform the analyses within acceptable limits. All metals analyses showed acceptable standard deviation from the norm and acceptable percent bias. All labs correctly identified the PCB, Aroclor 1248, on their first attempt, and all reported values falling within method 608's acceptability range. Justification for developing and implementing an interlaboratory chemical testing program within the Corps has taken the form of an Engineer Regulation (ER 1110-2), which is in its last draft before finalization.

Q: Who will pay for the samples analyzed in the testing program?

A: It is presently the opinion of HQUSACE that when issued as an ER the Division labs will find their own funding to support the program. Funding to coordinate the program itself has not yet been approved.

Suggestion: The testing program would be of greater value if it incorporated parameters other than those available in EPA's metals and nutrients QC samples. Soil samples would be of value to the labs.

Response: Soil QC samples are being prepared for the program.

An Overview of Munitions Analyses

Mr. Tom Jenkins
Cold Regions Research and Engineering Laboratory

Sponsored by the US Army Toxic and Hazardous Materials Agency and intended to provide standardized procedures to be used in the USATHAMA program, the Cold Regions Research and Engineering Laboratory (CRREL) has been involved in the development of methods for determining trace levels of munitions in environmental samples. Development of these procedures has required that certain constraints inherent in each analyte's nature be overcome. Some of the constraints to be taken into consideration are the variety of analytes present within each sample, their thermal liability, their hydrophilicity, the wide dynamic range (microgram per gram to percentage) which may be present in soil samples, and the need for a simple method of analysis allowing high sample throughput. Currently, procedures exist for extracting such analytes as nitramines, nitroaromatics, tetrazene, and nitroguanidine from soil and water samples. The extracts are analyzed by high performance liquid chromatography (HPLC). The lab is in the process of developing analytical methods for the determination of nitroglycerin. Development of equivalent methods for plant analysis using HPLC have been hindered by the solvents' tendency to extract other compounds from the plant material.

Ion Chromatography, the Dionex System

Audience Discussion

The Dionex Ion Chromatographic System has proven to be less versatile for routine chemical analysis of water quality samples than expected. The system exhibits problems in analyzing samples containing high phosphates and sulfates and therefore is unable to analyze field samples preserved with sulfuric acid. Several labs have used the Dionex System successfully for other types of analysis. It has been used to follow the movement of water in frozen soils using the bromide ion as a tracer and has been used successfully in the initial screening of unpreserved samples from suspected hazardous waste sites.

Demonstration of the Nelson Analytical Chromatography System

Mr. Newberry Brown
US Army Engineer Waterways Experiment Station

The Nelson Analytical System is a data-processing system designed to enhance the collection and manipulation of analog data. The Nelson System consists of an IBM AT personal computer, software, printer, and one series 760 interface for each input device. The system has the capability of collecting raw data from up to 16 single- or 8 double-channeled input devices. The source instrumentation must be able to convert analog signals to digital. During the analytical run, the digital signals are transferred to and stored in the interface until the central processing unit (CPU) is ready to accept them. In the computer, raw data are stored on the hard disk in the voltage points file. This file interacts with other files to create another file, which stores calculated data (i.e., peak heights, areas, concentrations, and retention times). The Nelson System enables the analyst to simultaneously acquire new data while working with existing data. Chromatograms can be viewed, data recalled and calculated, and reports printed. Data from completed jobs can be taken off the hard disk, archived on diskettes, and stored indefinitely.

Inspecting Contract Laboratories

Mr. Jim Nowland
South Atlantic Division

Any laboratory contracting to perform water quality analysis for Corps projects is required to be inspected and validated before work can begin. In most cases the lab being inspected has already been selected to perform the analysis. It is the inspector's responsibility to ensure that the Corps receive the best quality product possible from the contracting lab. The inspector must establish himself as a professional, knowledgeable about the analyses to be performed (in both methods and instrumentation) and able to communicate at a sufficiently high level within his field of expertise. Ideally, prior to visiting the site, the inspector will have had access to the contractor's chemical quality control plan, the lab's quality control plan, results of audit sample analysis, and other pertinent documents. He may have requested and received information from the contracting lab concerning equipment, instrumentation, and personnel qualifications. Such information can be time-saving and will allow him to concentrate on the lab itself. At the site the inspector must ensure that the lab has the capabilities to perform the required analyses within the time specified. The inspector should look at the equipment and instrumentation and examine the chemical stock as to age and purity. He should interview the technicians as well as the management, observe their methods, and assure himself that they can perform the proper calculations. The inspector should be able to detect problems and provide guidance if necessary. He should examine the facility for adequate bench services and take note of the internal and external environment keeping in mind the analyses to be performed.

Finally the inspector's report should be factual and in an easy-to-follow format. Discrepancies or problems found during the inspection should be noted along with the name of the employee with whom the problem was discussed and the steps taken to correct the problem.

Question: What do you do if the manager will not let you talk to the bench level technicians alone?

Answer: You talk to them anyway realizing that there is probably something to hide.

Question: Where do audit samples fit into the inspection?

Answer: The samples are a part of the lab validation. One bad value in an audit sample should not disqualify the lab.

Comment: Water quality contracts have lab inspection clauses saying that the contract is dependent upon the inspection.

Response: This is recent. Usually the contract is already let, and the lab preselected.

Question: How much teaching should inspectors do if their function is to validate the lab?

Answer: If the lab already has the contract, the inspector should help them turn out good data. It really depends upon where the lab is within the validation process and the Division's philosophy.

Actions to Take When Contract Labs Fail to Meet Specs

Dr. Joe Solsky
Missouri River Division

When Corps projects involve sampling and chemical analysis, the project manager depends upon the expertise of the QA lab to ensure that the contractors produce accurate, quality data. Problems which could potentially compromise the data and therefore the success and effectiveness of the project may be detected when samples first arrive at the QA lab, when the contractor's data are received and reviewed, or when the data from QA and QC samples are compared.

Incoming samples should be compared against the AE's quality control plan for correct type of sample, correct preservatives, and correct containers. All conditions surrounding the receipt of each sample shipment should be documented on some type of form, and each sample entered into a bound master log book. Most problems encountered at this stage can be corrected within 24 hr at little additional trouble or expense to the project by simply contacting the project manager or the sampling team.

Discrepancies appearing as the QA lab begins compiling and reviewing the contractor's chemical data usually involve missing field data and missing or

inconsistent QC data. Daily QC blanks and spikes may be available and could be obtained if specified in any of the contracting documents (i.e., the Scope of Work or the AE/QC plan). Otherwise there is little recourse available for problem resolution. At this point the contractor's work is essentially completed with only the final report remaining. Funds may not be available to finance additional sampling or analysis. The only true solution to problems of this type is the insistence by the QA lab's document reviewers that project Scopes of Work and AE/QC plans be more detailed and complete.

The QA data validation process can also bring data discrepancies to light. Since there are few guidelines available for validating data obtained from QA/QC split samples, the evaluator must be knowledgeable in methodology, instrumentation, and the data values expected. In some cases the method QC data may look good, but the data sets will not agree. Again, adequate documentation is the key to determining the correctness of the QA lab's data and its judgments. The QC lab must be convinced that the QA lab is right. Resolving worst-case discrepancy problems may involve the reanalysis of all samples or even the resampling of the site itself.

Methods for Evaluating and Validating Data

Dr. Joe Solsky
Missouri River Division

Data generated during the execution of a Corps project must be evaluated for accuracy and judged for usefulness contributing toward the resolution of that project. This validation usually takes the form of the QA/QC final report and is compiled and written by the QA laboratory.

Chemical data evaluation takes into consideration such factors as discrepancies in data, discrepancies in detection limits, unacceptable recoveries, variations between QA/QC split samples, missing samples or analyses, and any pertinent documentation or lack thereof.

At MRD, QA/QC reports follow a three-part format: a cover letter in the form of a brief, factual summary; a section of data comparison tables; and a more detailed discussion of the data. Within this format each section of this report is complete and can be reviewed independently depending upon the level of complexity required.

SW-846 Methods, Should They be Used Exclusively for Superfund/DERP?

Audience Discussion

Question: Why not use the procedures for everything?

Comment: SW-846 methods are not statutorily correct for surface water.

Mr. John Adams, Buffalo District, distributed a listing of analytical methods deemed correct for a number of parameters in different matrices, i.e., soil, ground water, surface water, and fuel oils. Methods referenced originate from the USEPA, USATHAMA, and ASTM.

Conducting DERP Investigations in Remote Areas

Ms. Clare Jaeger
Alaska District

Remote areas present a unique set of conditions not normally encountered in standard field investigations. On the north slope of Alaska are abandoned World War II defense sites. Contaminants at these sites have minimal biodegradability due to extreme temperatures. These site contaminants are considered a threat to the US Fish and Wildlife game refuge.

Since many of the sites under investigation are only accessible by air, sampling trips are combined when possible to minimize costs. Sampling for characterization and confirmation studies are usually combined. Additional sampling may be required for construction and engineering design studies in which the AE firm is concerned with data validity as it pertains to project viability.

Detailed sampling plans are formulated prior to each sampling trip. Each sampling plan includes information on the number and types of field samples to be taken, information on the QA/QC samples to be taken, information on the analyses and approved test methods to be used, and a detailed equipment check list to ensure equipment availability prior to departure. For characterization studies, the sampling plan includes a site-specific safety plan.

Formulation of the sampling plan is a combined effort on the part of team biologists, chemists, engineers, geologists, and project managers.

Closing of the 1988 Corps Chemists Meeting

Ms. Lynn Lamar
Headquarters, US Army Corps of Engineer

This meeting was well attended, and the Analytical Laboratory Group, WES, were gracious hosts. The next meeting will be hosted by the Southwest Division. Suggested topics of interest for that meeting include: environmental regulations; risk assessment; anti-fouling agents; underground tank removal criteria, and topics of interest to the bench chemist.

Picture left to right:

Row 1: Ty Gouda, ORD Lab; Clare Jeager, Alaska District; Pam Bedore, Detroit District; Tom Leuschen, MRD Lab; Newberry Brown, WES-ALG; Linda Stevenson, WES-ALG; Agnes Morrow, WES-ALG; Ajmal Ilias, NPD Lab.

Row 2: Steve Servay, New Orleans District; Sam Taormina, SPD Lab; Mike Warren, WES-ALG; Bill Saner, ORD Lab; Dick Medary, Kansas City District; Richard Karn, WES-ALG; Anand Mudambi, NED Lab; Lynn Lamar, HQUSACE; Ann Strong, WES-ALG.

Row 3: John Adams, Buffalo District; Jim Nowland, SAD Lab; Ray Vogel, CERL; Frank Snitz, Detroit District; Del Connealy, Omaha District; Don Brown, WES-ALG; Mark Koenig, NED Lab; Jim Paxton, NPD Lab.

Row 4: Tracey Hooper, Nashville District; Dave Koran, ORD; Dave Bowman, Detroit District; Doug Webb, Nashville District; Joe Solsky, MRD Lab; Ray Montgomery, WES-EE; Marcia Davies, MRD.

Row 5: Rudy Richter, WES-CP; Bruce Heitke, HQUSACE; Walter Boyd, SAD Lab; Tom Furdek, St. Louis District.

Not Pictured: Cathy Hutchins and Jeff Tye, SWD Lab; Tom Jenkins, CRREL; Jeffretha Christian and Karen Myers, WES-ALG.